View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by NASA Technical Reports Server

Optoelectronic Infrastructure for Radio Frequency and Optical Phased Arrays

For sensing and data transfer applications

Optoelectronic integrated circuits offer radiation-hardened solutions for satellite systems in addition to improved size, weight, power, and bandwidth characteristics. ODIS, Inc., has developed optoelectronic integrated circuit technology for sensing and data transfer in phased arrays. The technology applies integrated components (lasers, amplifiers, modulators, detectors, and optical waveguide switches) to a radio frequency (RF) array with true time delay for beamsteering. Optical beamsteering is achieved by controlling the current in a two-dimensional (2D) array. In this project, ODIS integrated key components to produce common RF-optical aperture operation.

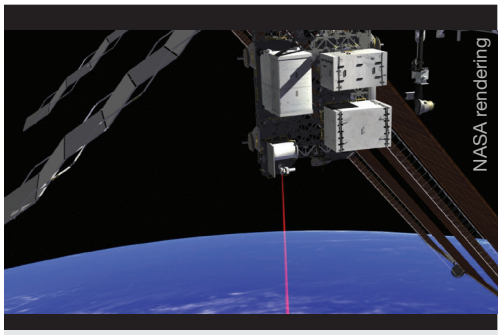
Applications

NASA

- Satellite sensors in the Ka-band and Ku-band for surface and object characterization
- Integrated platform circuits for laser and RF communications, internal satellite networking, RF photonics and analog-to-digital (AD) conversion, and high-speed systems
- Integrated platform imaging devices for spectral sensing

Commercial

- Computer buses
- AD converters
- Optical data links
- Optical switching matrices
- Optical routers
- Active optical cables
- High-speed servers
- Digital signal processors



Phase II Objectives

- Demonstrate the feasibility of combining RF and optical emission from a single aperture
- Demonstrate generation of low-phase noise RF using an optoelectronic oscillator
- Determine and demonstrate true time delay RF array-steering using microresonators to produce differential group delay
- Demonstrate feasibility of optical distribution of RF power and optoelectronic control of beam direction
- Display 2D optical beamsteering from coherent array via current control
- Prove viability of optoelectronic architecture for RF-optical cell

Benefits

- Enables collocation of RF and optically emitting devices in array formats
- Permits antiguiding to produce coherent optical beams
- Provides beamsteering of supermodes
- Offers optical distribution of RF by photodetector conversion
- Provides optical return signal remoting
- Permits true time delay for RF beamsteering

Firm Contact

ODIS, Inc.
Jianhong Cai
laser242@hotmail.com
22 Quail Run Road
Mansfield, CT 06268–2768
Phone: 860–486–3466

Proposal Number: 10-2 O1.01-9727